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AN

INAUGURAL ESSAY

ON

SOMNOLENCY;

FOR THE DEGREE OF DOCTOR OF PHYSICK,

Submitted to the consideration

OF

THE HON. ROBERT SMITH, PROVOST,

AND OF THE REGENTS,

OF THE

University of Maryland.

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OF CHESTER TOWN, MARYLAND,

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TO

DOCTOR MORGAN BROWNE,

OF CHESTER TOWN, MARYLAND,

THIS INAUGURAL ESSAY IS MOST RESPECTFULLY

DEDICATED,

As a small tribute of gratitude and esteem;

SO JUSTLY DUE TO HIM,

*For the benefit derived from his instruction, and for
the invaluable friendship and polite attention
bestowed on his former pupil,*

THE AUTHOR.

INTRODUCTION.

THE subject selected for the ground work of this essay has received but a small share of the regard of physiologists. Many of them have avoided it altogether; and the occasional attention which philosophical curiosity has paid it, is too limited and partial to throw more than a dim and doubtful light upon the path of inquiry. The state of somnolency appears in fact too deeply laid in nature's plan either to invite or encourage much effort at discovery. The prospect of success bears no proportion to the magnitude and complexity of the obstacles which block up the road of research. But it is the proper business of physical inquiry to encounter natural difficulties. The more simple information of the senses, is neither adequate to man's real wants, nor the just limit of his rational desires. Science would still have slumbered over confusion, had impediment or difficulty, always repressed the industry of intellect.

I cannot expect that my labours will remove obstacles which have hitherto barred us from truth on this subject, or dissipate the darkness which involves it; but perhaps part of these obstacles and that darkness are artificial, and with less ingenuity man has led oth-

ers into plausible error, I may be able to detect some of the mistakes into which they have fallen. In the examination of every subject, if erroneous or inadequate principles have been planted in our way, they must be unrooted before we can progress regularly towards our object. The best surveyor will be perplexed when falling in with wrong land-marks.

It appears to me that the attempt to simplify the operations of the animal economy has obscured rather than enlightened many subjects of physical inquiry. That in the effort to reduce natural phenomena to the level of our conceptions, we have more often imagined arbitrary laws for their government, than discovered real ones. Such in my opinion is the fact with regard to general sentiment on the sleeping state. In making that state consist necessarily in a certain relation between animal action and consequence, or a certain sum of exertion, and a definite exhaustion of the animal faculties, it appears to me that facts not easily explained, but not on that account less true, or forcible, and altogether at variance with the conclusion attempted to be established, have been either forgotten, or disingenuously denied their proper weight. When we find that conclusion resting too, on a position which impeaches the maturity or perfection of the great plan of creation, we are strongly impelled to doubt the integrity of the basis on which it is built. For if the postulate that somnolency consists in a given degree of animal debility, were tenable, it follows of necessity, that a state of imperfect health must be preexistent to its occurrence. I can affix no other meaning to the

term debility, (the one selected by writers to express the prerequisite to sleep,) than the negative of real health, though not necessarily, the state of actual disease. It is with a hope, rather than a self-satisfied confidence, of rescuing the animal constitution from this assertion of imperfection, in one of its fundamental and most important laws, that I have ventured on a country where the labours of the pioneer have smoothed but few, if any asperities; whose charts exhibit more of conjecture, than observation or measurement.

I have occasionally referred, in the following work, to the habitudes of inferiour animals, in illustration of the ground of dissent from common opinion, on the modes and causes of vigilance and sleep. We observe in the general, a much greater propensity among those orders, than in man, to fall into the sleeping state. They sleep more in the aggregate, and their periods of alternate vigilance and somnolency are also less regular than with us. Perhaps both of those facts have their solution in a regard to the different capacities and operations of the respective intellect. Inferiour animals can be interested, but in a partial degree, in those circumstances, and functions of mind, which influence in a sensible and forcible nanner man's animal condition. Beyond the simple operations of the senses, the brute mind is but little exercised. And his body partakes the quietude and disengagement of his understanding.

ESSAY.

AS it has been the object of learned and ingenious men of all ages to investigate the intricate and mysterious subjects of science, it is much to be regretted, that the science of physiology or so great a proportion of it, should still remain among the arcana of nature, undiscovered and unimproved.

The deep penetration, and research of a Haller, a Blumenbach, &c. did not fail to discover and explain many of the important operations of the animal economy; yet so imperfect and limited is the mind of man, however cultivated and improved it may be, that it is still unable to unfold and explain the causes of many phenomena of nature which are obvious to the senses. Therefore as we are unable to account for those phenomena from our ignorance of the causes which induce them, we are under the necessity of drawing our most rational conclusions from effects only.

It is with much diffidence that I attempt the investigation of this subject, being conscious of my own inability to do it justice, involved as it is in so much mystery and doubt.

Different opinions respecting the causes of sleep, have been entertained; though ingenious and plausible, yet I think they are unfounded and unnatural. It

will doubtless be considered presumption in me to attempt to oppose those opinions as they have been advanced by some of the most learned and ingenious authors; but as one of the learned professors of this university observed "the greater the authorities, the more should we be disposed to examine the doctrines, or opinions advanced by them."

I shall in the first place, proceed to take notice of the opinion of doctor Blumenbach respecting the remote causes of sleep. "The remote causes which induce sleep are very plain and obvious. We may consider as very energetick causes, in the production of this state, all waste of the animal powers, by means of preceding fatigue, by watchings," &c. It would appear from this, and the following, that the doctor considers the causes of sleep dependent, exclusively on the operations of the animal faculties, and whatever tends to waste or exhaust them to a certain degree must invariably produce the effect.

He further adds, to these we may subjoin the influence of custom, together with silence, darkness, rest, &c. which appear indeed to derive their somniferous effects from the same source, "that is from the waste or exhaustion of the animal powers." If we admit these to be the remote causes, we must conclude that in proportion to their increased force of action, in the same inverse ratio of time, should we have the effect produced; but daily observation proves this not to be the case. Suppose for instance, that a man be subjected to running, jumping, or leaping, until he becomes so much exhausted, that he is unable to make those exertions any longer,

will sleep invariably be the consequence? if not, these debilitating causes do not necessarily induce the sleeping condition. There must be, agreeably to the doctor's opinion, a certain quantum of those powers necessarily wasted before the effect can possibly take place; therefore it is only requisite to impair those powers to a certain degree, by any of the preceding causes, and in proportion to the violence of those causes must be the effect, and as fatigue, &c. is the most energetick, it must (agreeably to this doctrine,) if it be excessive, bring on that state or condition of the body favourable to the production of sleep in a very short time; for it is evident that violent exercise continued, but a few minutes, will occasion considerable fatigue and necessarily an impairment of those powers; but we do not discover in this case so great a propensity or disposition to fall into the sleeping state, as we should, if there had been no fatigue induced; therefore it is very obvious, that excess of bodily exercise, or violent operations of the mental faculties, do, instead of producing sleep, occasion a greater degree of vigilance than is natural. I would ask why, as the doctor considers fatigue, &c. the most energetick causes, in the production of the sleeping state, their somniferous effects are not always in proportion to the exhaustion of the animal powers.

It is very evident that there is a greater proclivity to sleep under circumstances, where rest, silence, and darkness are enjoyed, and the senses suspended, than when exertion is made and light and sound are present; although the latter waste the excitability and induce

fatigue: we not only discover this to be the case in the human species; but we also observe among inferiour animals a greater disposition, to fall into a sleeping state, while they are unemployed, than when they are exercising in their ordinary capacities: therefore I think it reasonable to conclude, that there cannot be any determinate sum of debility essentially requisite to the induction of sleep. That the remote causes do not necessarily, sink the natural powers below the standard of perfect health in order to throw the body into sleep. On the contrary, judging from reasoning, the evidence of general facts, and (if such an argument be admissible,) personal experience, I should conclude, that a just balance of sensation, the state of full health, was that, most friendly to the enjoying of sound or natural sleep, and the only one in which its appointed purpose, the periodical restoration of animal faculties, could be happily accomplished. Debility, in my understanding, means a falling off from health, or a condition of disease; and it appears irrational to suppose the animal economy so constituted, as to fall, of necessity into even partial debility or disease, before the self preservative principle could be called into exertion.

“Those remote causes, says doctor Blumenbach, which we have mentioned, are of themselves sufficient to conduct us to the proximate cause, which appears, from the best evidence that can be collected on the subject, to consist in a diminution of the column of blood that goes to supply the incephalon.” That the quantity of blood which circulates through the brain in a given time, during sleep, is less than in a waking state, I am dis-

posed to deny, it may pass with diminished frequency or force, when less stimulus is present; but the quantity sent on to the head at each contraction of the heart &c. is the same. I would ask the doctor what becomes of the quantity of blood that is excluded from the brain at the approach of sleep, does the liver (as the ancients supposed,) perform the office of a reservoir, or is there other receptacles such as the spleen, and thyroïd gland (as one of the moderns supposes,) which retain it until the waking state arrives, and then send it on to the encephalon. I should also like to know how or by what agency this portion of blood is prevented from circulating through the vessels of the brain, I can conceive but two ways in which this could be accomplished, and they appear to be equally as chimerical as they are erroneous, viz. that the carotids must possess some inherent power, or valves which act as centinels, to watch the approach of sleep, and at that moment to interrupt its passage to the incephalon, and divert it to other parts destined to receive it, or that the diastolick action of the heart is incapable of propelling it on to the vessels of the brain; but if this were the case, sleep would, invariably be the result of every case of debility, or diminished arterial action.

If a diminution of the quantity of blood in the brain be the proximate cause of sleep, whatever tends to diminish the determination of it there, must facilitate its production, hence it would be more liable to take place in an erect, than a recumbent posture, for I believe it is generally admitted that the former position is more favourable to that than the latter, in consequence of

the circulation, being somewhat impeded by the laws of gravitation, or, the force of the heart, &c. is somewhat subdued by the resistance of gravitation, and the momentum less but the quantity of blood the same. Therefore as the most natural position for sleep, with the human species, is a recumbent one, and this, being more favourable to a determination of blood to the in-cephalon, than an erect posture, it is very evident that the proximate cause cannot depend on a diminished quantity of blood in the brain.

The opinion of the ingenious doctor Brown on this subject appears to be equally exceptionable. Perfect health he considers, to consist in an equilibrium of excitement and excitability or equal degrees of each: an accumulation, or exhaustion of fifteen degrees of either, predisposition to disease; and a greater increase, disease itself. As the doctor considers disease to consist in a deviation or change of this condition of excitement and excitability, there must be a derangement of the healthy functions whenever this is the case; notwithstanding he contends that sleep is the effect of a diminished excitability, or in other words, is a state of indirect debility. To illustrate this, he supposes for instance, the excitement to be at thirty degrees: by a few glasses of wine it rises to the standard of health, a few more glasses will raise it still higher. A person he says stimulated in this way, will now display the full extent of his genius, his passions, and emotions of whatever kind will rise in the same proportion. If he were to repeat a few more glasses, we should see the effect materially changed; he would gradually fall off

in his spirits, in his intellectual, and his corporal functions, his tongue, his feet, his eyes, his memory, and his judgment, all fail him, he at last becomes drowsy and falls asleep. A question will arise here whether we are to consider sleep a morbid condition of the body, or that state which nature has designed to carry on her assimilating process to a more perfect degree, and to invigorate and refresh the animal functions: this question I think does scarcely require an answer, as it is so very evident that the natural functions, go on with their operations, less disturbed or interrupted, and in a more perfect manner, in a sleeping, than in a vigilant, condition; we observe it to be a universal and fixed law of nature that all animals after a full meal, are more inclined to sleep than they were previously. What could have been her intention in this, if it were not to remove or suspend those causes which have a tendency to interrupt the process of digestion and favour animalization.

Now as we observe, during the phenomena of this state, respiration, digestion, and the circulation, going in their regular routine of action, in a more perfect manner, we may, I think, with much more propriety, conclude that sleep is the grand restorative of nature, therefore I presume I shall be justified in considering it a salutary, and not a morbid condition of the body. To return to the illustration of doctor Brown's theory, it will be necessary to examine the state in which we find the person, after being roused from his sleep induced by inebriety, or in other words, indirect debility, (which the doctor considers in every case to be the

cause of sleep.) He complains of languor, debility, sickness at the stomach, sometimes vomitings, tremors, &c. these symptoms, I think, are better calculated to characterize a disease, than the salutary operations of nature. The doctor contends that there is, at the waking period, an accumulation of excitability, or a reinstatement of that which was exhausted by the operations of the preceding stimuli (but this appears to be very inconsistent with his illustration and the preceding remarks:) now it appears to be necessary (agreeably to this,) before sleep can be induced, that this excitability should be sufficiently diminished by the effect of stimuli to produce indirect debility before it can take place. This appears to be strange reasoning, but not more strange than unnatural and unphilosophical, which I shall attempt to prove, by appealing to the experience and observation of mankind in general: does a person from the time he awakes, feel disposed to sleep after exercising five or six hours, so as to occasion a degree of weariness? it appears not; but after a full meal, when his spirits, his strength, &c. are refreshed, and invigorated, he feels a great propensity to sleep, and this is not only the case with man; but also among inferior animals, for whenever their stomachs become distended with alimentary matter, we see them disposed to fall into that state. Doctor Brown would contend that it was occasioned by the stimulus of the food, which produced indirect debility; but it is very evident that the pulse though more frequent, is much fuller and stronger, than it was previous to the reception of the aliment.

If sleep were the result of indirect debility, there must be a derangement or an interruption of the healthy operations of nature, and in proportion to its degree, would be the exhaustion; for if sleep is a consequence or a state of debility, it would be very absurd to suppose that it would be capable of restoring or refreshing, the exhausted condition of the system; either from its soundness or duration. We might with equal propriety say disease induced by indirect debility, such as the yellow fever, the gout, &c. were salutary, and calculated to restore the diminished excitability, and invigorate the system, for if they are both brought on or induced by the same causes (a diminished excitability,) they must be governed by the same laws, consequently their effects must be the same; now I would ask, can we with any propriety suppose that debility is necessary to constitute healthy and natural sleep, when we observe different nations, and individuals employed in various avocations, subject to different degrees of the operations of the corporal and mental powers, and also to debilitating causes, and all having nearly fixed and stated periods to fall into that state, and whose systems require to remain in it, for a similar length of time: viz. from six to eight hours.

As I have attempted to refute the opinions of others, respecting the causes of sleep, it may be expected that I should give an opinion of my own on the subject; but I should feel much hesitation, in attempting to prove that it depends upon the operation of any known cause or causes, as it still appears to be one of the secrets of nature which has never been satisfactorily unfolded.

Daily observation and experience teach us, that it is as indispensably necessary to the support and existence of animal life as the process of digestion or respiration, and as requisite to the health and nutrition of the animal system as either of them.

I shall agree with doctor Brown, and some others, respecting the application of mild stimuli and gentle exercise, being favourable to the production of healthy and salutary sleep; though not from their inducing indirect debility; but by their conduciveness to the healthy operations of the natural functions, and as far as the use of stimulants or exercise, are consistent with health, so far may they be considered favourable to that state: whenever they tend to interrupt the regular operations of nature, they must, I think, instead of occasioning natural sleep produce disease, or a morbid state of vigilance. The narcotick medicines, and intense cold, appear to possess the power of robbing the system of that irritability necessary, to the constitution of the vigilant condition; but sleep induced in this way, I conceive to be unnatural, inasmuch as they have a tendency in a state of health to produce morbid effects, notwithstanding their somniferous powers in certain states of the system, may be productive of the happiest effects. Where violent pain has existed for some length of time, and sleep, being interrupted, a small dose of opium will seldom fail to mitigate it, and occasion repose, also in low states of fever, in which morbid vigilance is a frequent attendant; an anodine, in this case generally succeeds in removing the irritability, and occasions a refreshing sleep. The *modus operandi* of

opium in those cases will, I think, have a tendency to prove, that health is the most favourable condition to sleep; the pain in the first case is removed and there is as it were a temporary state of health, hence sleep ensues. In the other case there is great debility, consequently a morbid vigilance, opium in this case, tends to remove the debility, by increasing the excitement, or restore in a measure the balance of the system, and enable the patient to fall into a refreshing sleep.

Farther to prove that sleep is natural, it will I presume only be necessary to observe the phenomena which take place during the continuance of a disease. We see in almost every case (where the brain is not affected,) from the commencement of the unfavourable change, a want of disposition to sleep; if the patient happens to fall into a dose, he is troubled with unpleasant dreams (which is a proof of interrupted sleep,) when he awakes he finds himself unrefreshed, and frequently if the disease be acute his symptoms will be aggravated; thus we observe during the progress of the disease, the natural laws interrupted and unable to perform their respective offices; not only is sleep interrupted, but also the process of digestion and respiration. Now, to take a view of the convalescent state, we shall observe a complete change with respect to the natural functions. As soon as the process of the disease is arrested, and the patient begins to convalesce we observe nature resuming her salutary operations, respiration, digestion, and nutrition, which have been more or less interrupted, now go on with their respective offices. The propensity for the salutary

agency of sleep is very great, the patient is disposed to remain in that state the greatest part of his time, until exhausted nature is restored to the condition of health, and then we again observe the regular order of her operations going on in their ordinary way.

That sleep is a natural state; I shall conclude, first; that it occurs at regular and fixed periods. Secondly: that it is governed by permanent and immutable laws in every species of animated nature. Thirdly: that it is as indispensably necessary for the health and growth of the animal system as either of the natural functions.

Lastly: the liability of the healthy functions to be deranged whenever its recurrence is protracted beyond the usual period.